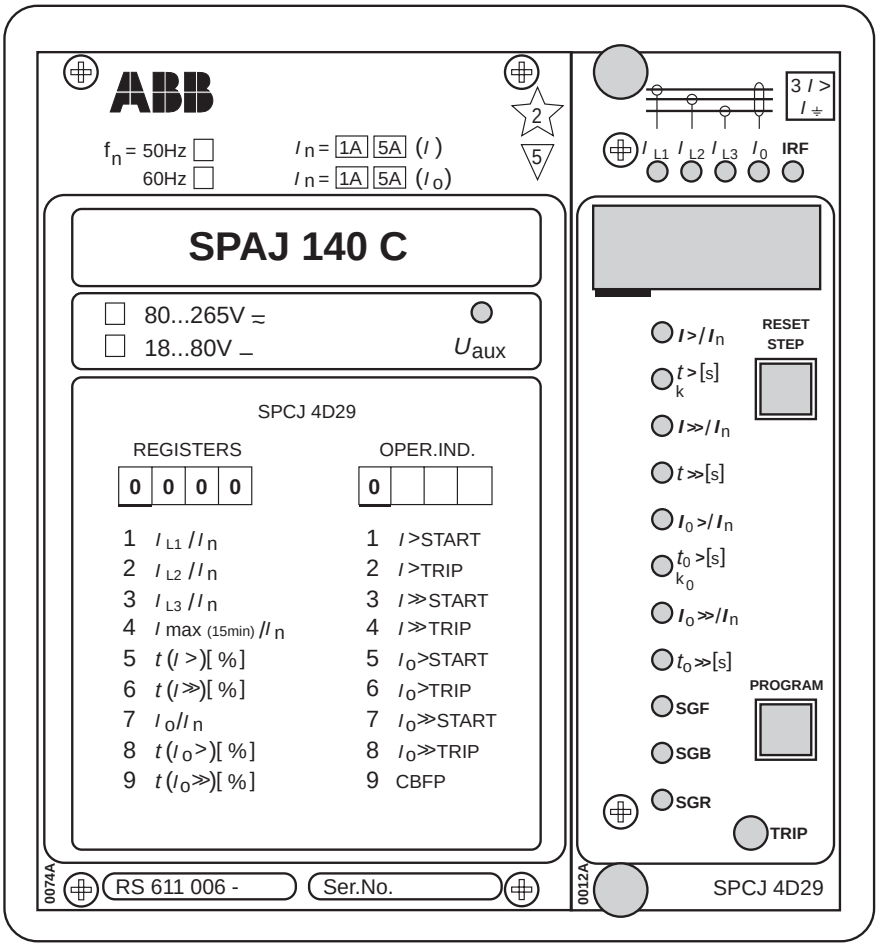
SPAJ 140 C
Overcurrent and earth-fault relay

User´s manual and Technical description



1MRS 750629

Issued 1997-01-30
Modified 2007-02-26
Version D

SPAJ 140 C
Combined overcurrent and earth-fault relay

Data subject to change without notice

Contents

The complete manual for the relay SPAJ 140 C contains the following submanuals:

General relay description for SPAJ 140 C	1MRS 750629
General characteristics of D type relay modules	1MRS 750066-MUM EN
Combined overcurrent and earth-fault relay module type SPCJ 4D29	1MRS 750119

Features

Three-phase, low-set phase overcurrent unit with definite time or inverse definite minimum time (IDMT) characteristic

Three-phase, high-set phase overcurrent unit with instantaneous or definite time function

Low-set, non-directional earth-fault unit with definite time or inverse definite minimum time (IDMT) characteristic

High-set, non-directional earth-fault unit with instantaneous or definite time function

Built-in breaker failure protection function

Two heavy-duty and four light-duty output relays with field-selectable configuration

Extensive data communication capabilities over built-in serial port

Outstanding design flexibility for easy selection of appropriate operation schemes for different applications

Numerical display of setting values, measured values, memorized fault values, fault codes etc.

Enhanced system reliability and availability due to continuous hardware and software self-supervision with auto-diagnosis

Powerful software support for setting and parametrizing of the relay and for recording of relay parameters with a portable PC.

Application

The combined overcurrent and earth-fault relay SPAJ 140 C is intended to be used for the selective short-circuit and earth-fault protection of radial feeders in solidly earthed, resistance earthed or impedance earthed power systems. The integrated protection relay includes a phase overcurrent unit and an earth-fault unit with flexible tripping and signalling facilities. The overcurrent and earth-fault relays can also be used inother applications requiring single-, two- or three-phase overcurrent protection and non-directional earth-fault protection. The combined overcurrent and earth-fault relay also features circuit breaker failure protection.

Description of operation

The combined overcurrent and earth-fault relay is a secondary relay to be connected to the current transformers of the protected object. The three-phase overcurrent unit and the earth-fault unit continuously measure the phase currents and the neutral current of the protected object. On detection of a fault the relay starts, trips the circuit breaker, initiates auto-reclosing, provides alarm, records fault data etc. in accordance with the application and the configured relay functions.

When the phase current exceeds the set start current of the low-set stage I>, the overcurrent unit starts delivering a start signal after a preset ~60 ms start time. When the set operate time at definite time operation or the calculated operate time at inverse time operation elapses, the overcurrent unit operates. In the same way the high-set stage I>> of the overcurrent unit starts delivering a start signal after a preset ~40 ms start time, when the set start current is exceeded. When the set operate time elapses, the overcurrent unit operates.

When the earth-fault current exceeds the set start current of the low-set stage I_0>, the earth-fault unit starts delivering a start signal after a preset ~60 ms start time. When the set operate time at definite time operation or the calculated operate time at inverse time operation elapses, the earth-fault unit operates. In the same way the high-set stage I_0>> of the earth-fault unit starts delivering a start signal after a preset ~40 ms start time, when the set start current is exceeded. When the set operate time elapses, the earth-fault unit operates.

The low-set stage of the overcurrent unit and the low-set stage of the earth-fault unit may be given definite time or inverse definite minimum time (IDMT) characteristic. When the IDMT characteristic is chosen six time/current curves are available. Four of the curves comply with the BS 142 and IEC 60255 and are named "Normal inverse", "Very inverse", "Extremely inverse" and "Long-time inverse". The two additional inverse time curves called the "RI-curve" and the "RXIDG-curve" are also provided.

By appropriate configuration of the output relay matrix, the start signals of the overcurrent and earth-fault units are obtained as contact functions. The start signals can be used for blocking co-operating protection relays, for signalling and for initiating auto-reclosing.

The relay includes one external binary input, which is controlled by an external control voltage. The function of the control input is determined by selector switches in the protection relay module. The control input can be used for blocking the operation of one or more protection stages, for resetting a latched output relay in the manual reset mode or for enforcing a new set of relay setting parameters by remote control.

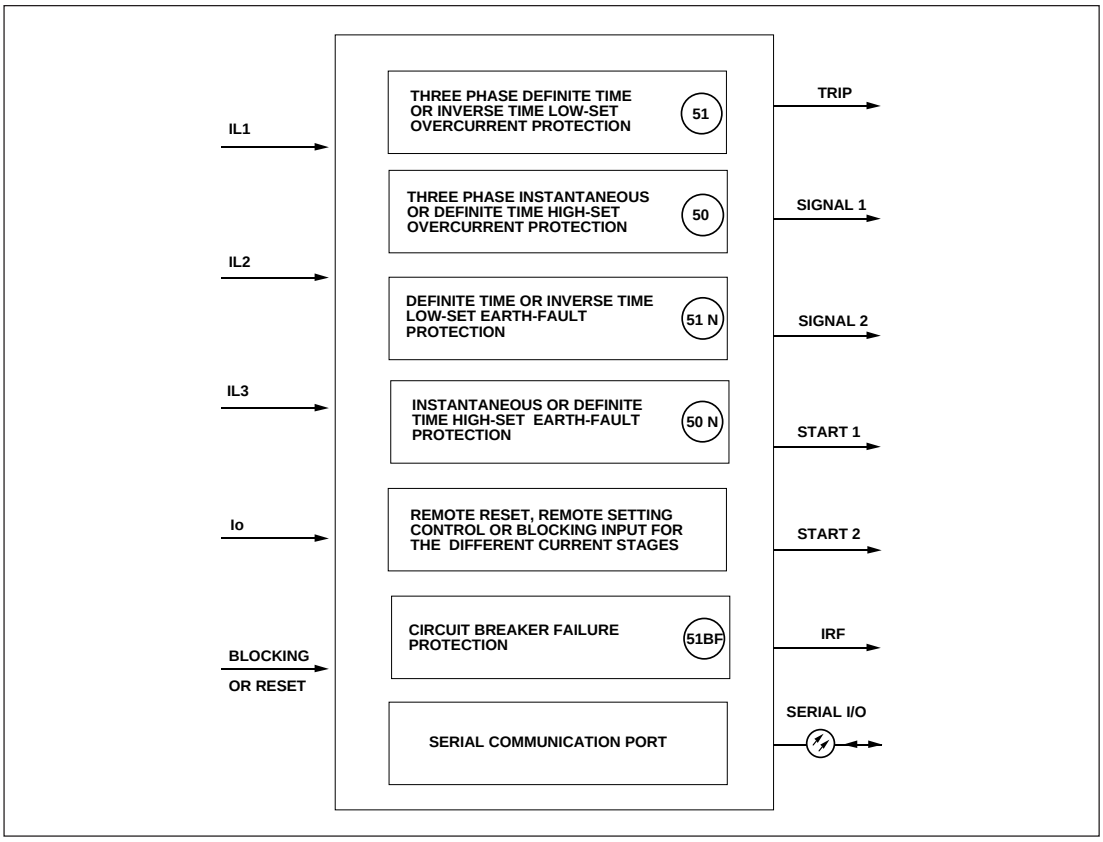


Fig. 1. Protection functions of the combined overcurrent and earth-fault relay type SPAJ 140 C.

Connections
(modified 2003-09)

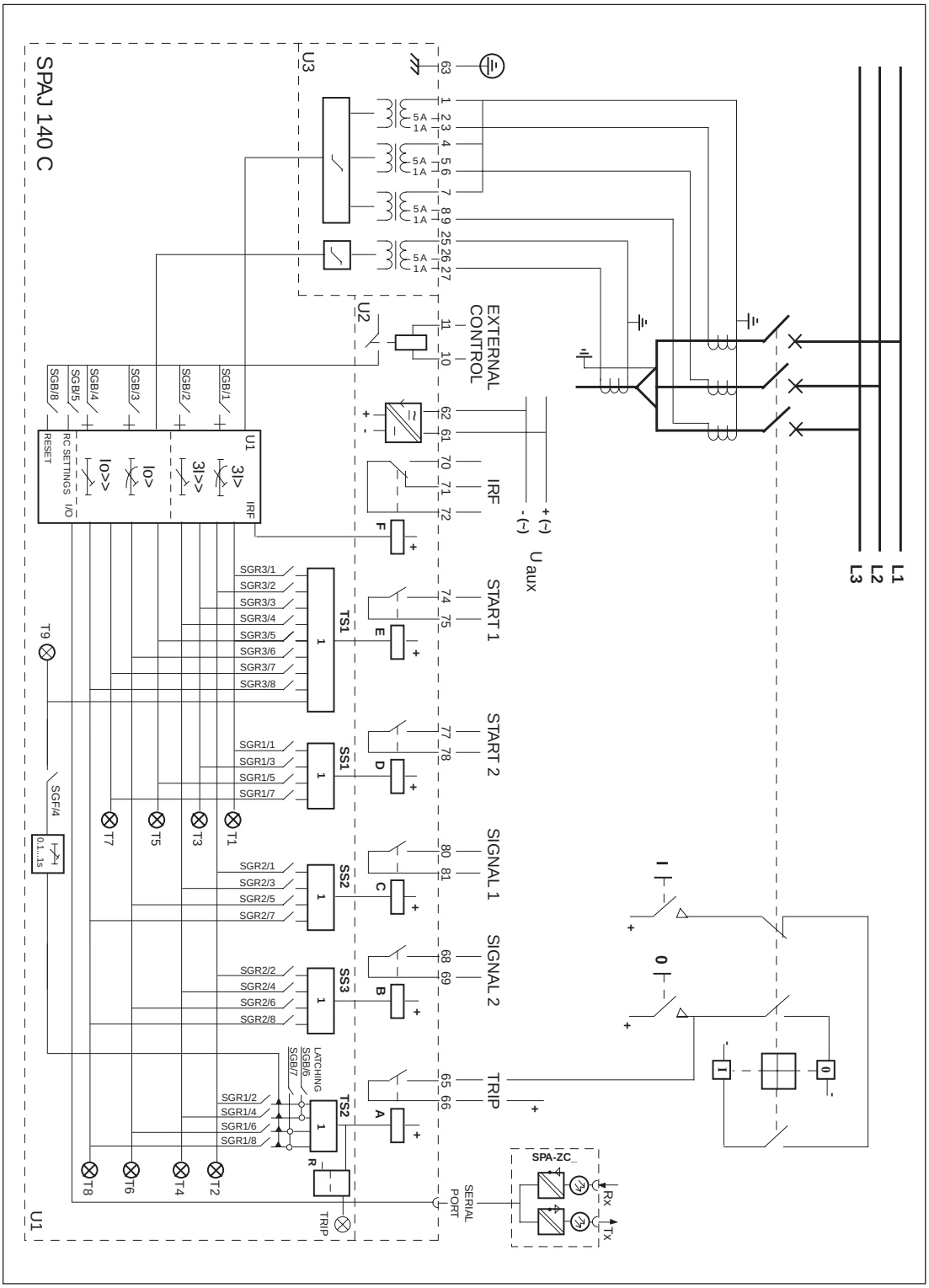


Fig. 2. Connection diagram for the combined overcurrent and earth-fault relay type SPAJ 140 C.

U_{aux}	Auxiliary voltage
A, B, C, D, E, F	Output relays
IRF	Self-supervision
SGR	Switchgroups for the configuration of the output relays
SGB	Switchgroup for the configuration of the blocking or control signal
TRIP	Trip output relay
SIGNAL 1	Signal on operation of the overcurrent unit
SIGNAL 2	Signal on operation of the earth-fault unit
START 1	Starting or auxiliary trip signal as selected with switchgroup SGR3
START 2	Start signal of the low-set overcurrent stage I>
U1	Overcurrent and earth-fault relay module SPCJ 4D29
U3	Input module SPTE 4E1
U2	Power supply and output relay module SPTU 240 R1 or SPTU 48 R1
T1…T9	Start and operation indications
SERIAL PORT	Serial communication port
SPA-ZC_	Bus connection module
Rx/Tx	Receiver bus terminal (Rx) and transmitter bus terminal (Tx) of the bus connection module

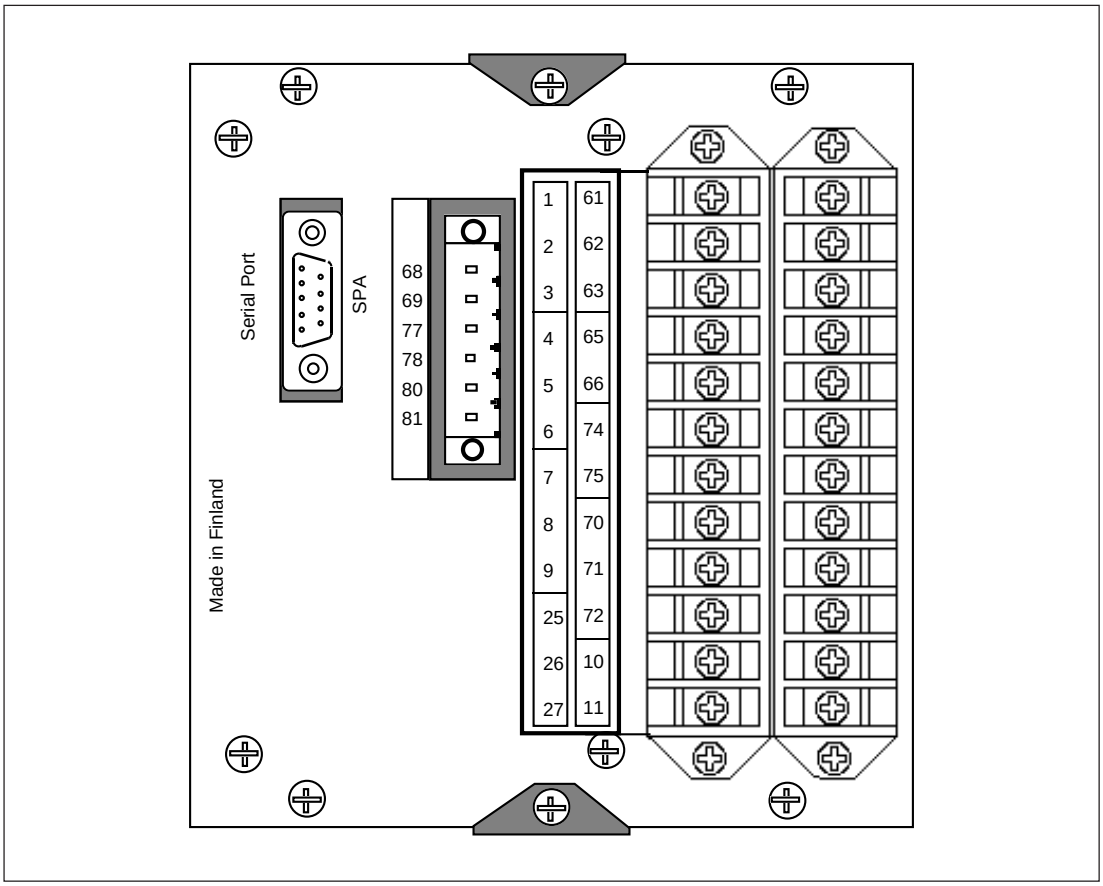


Fig. 3. Terminal arrangement of the overcurrent and earth-fault relay type SPAJ 140 C.